

What is claimed is:

1. A method for proliferating hematopoietic lineage cells comprising expressing the following polypeptide (a), (b), (c), or (d) having activity of proliferating hematopoietic lineage cells using a gene encoding said polypeptide:

(a) a polypeptide as shown in SEQ ID NO: 1;

(b) a polypeptide comprising at least amino acid residues 28 to 202 in the sequence as shown in SEQ ID NO: 1;

(c) a polypeptide consisting of a sequence derived from the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells; or

(d) a polypeptide derived from the polypeptide composed of amino acid residues 28 to 202 of the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells.

2. A method for proliferating hematopoietic lineage cells comprising expressing the gene consisting of the following DNA (a), (b), or (c):

(a) DNA as shown in SEQ ID NO: 2;

(b) DNA comprising at least nucleotides 81 to 606 of the DNA sequence as shown in SEQ ID NO: 2; or

(c) DNA hybridizing under stringent conditions to DNA (a) or (b) and encoding a protein having Indian hedgehog activity.

3. Bone marrow stromal cells comprising the gene encoding the following polypeptide (a), (b), (c), or (d) having activity of proliferating hematopoietic lineage cells introduced therein:

(a) a polypeptide as shown in SEQ ID NO: 1;

(b) a polypeptide comprising at least amino acid residues 28 to 202 in the sequence as shown in SEQ ID NO: 1;

(c) a polypeptide consisting of a sequence derived from the sequence as shown

in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells; or

(d) a polypeptide derived from the polypeptide composed of amino acid residues 28 to 202 of the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells.

4. The bone marrow stromal cells according to claim 3, which are stromal cells to which human telomerase catalytic domain (hTERT) genes have been already introduced.

5. The bone marrow stromal cells according to claim 3 or 4, wherein the gene encoding the polypeptide having activity of proliferating hematopoietic lineage cells is introduced with the use of a retroviral vector.

6. A method for proliferating hematopoietic lineage cells comprising subjecting the bone marrow stromal cells according to any one of claims 3 to 5 to coculture with hematopoietic lineage cells.

7. The method according to claim 6, wherein the hematopoietic lineage cells are cord-blood-derived CD34+ cells.

8. The method according to claim 6 or 7, wherein coculture is carried out in the presence of cytokines.

9. The method according to any one of claims 6 to 8, wherein coculture is carried out for 2 to 4 weeks.

10. Artificial bone marrow comprising the bone marrow stromal cells and hematopoietic lineage cells according to any one of claims 3 to 5.

11. An expression vector for enhancing hematopoiesis comprising the gene encoding the following polypeptide (a), (b), (c), or (d) having activity of proliferating hematopoietic lineage cells:

(a) a polypeptide as shown in SEQ ID NO: 1;

(b) a polypeptide comprising at least amino acid residues 28 to 202 in the sequence as shown in SEQ ID NO: 1;

(c) a polypeptide consisting of a sequence derived from the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells; or

(d) a polypeptide derived from the polypeptide composed of amino acid residues 28 to 202 of the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells.

12. An agent for proliferating hematopoietic lineage cells comprising, as an active ingredient, the following polypeptide (a), (b), (c), or (d) having activity of proliferating hematopoietic lineage cells:

(a) a polypeptide as shown in SEQ ID NO: 1;

(b) a polypeptide comprising at least amino acid residues 28 to 202 in the sequence as shown in SEQ ID NO: 1;

(c) a polypeptide consisting of a sequence derived from the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells; or

(d) a polypeptide derived from the polypeptide composed of amino acid residues 28 to 202 of the sequence as shown in SEQ ID NO: 1 by deletion, substitution, and/or addition of one to several amino acid residues and having activity of proliferating hematopoietic lineage cells.

13. The proliferating agent according to claim 12, wherein the hematopoietic lineage cells are human hematopoietic cells or human cord-blood-derived CD34+ cells.